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REMARKS

In the subject Office Action the Examiner finally rejected Claims 15-21, 23 and 25-26, all claims presently in the application, as obvious under 35 U.S.C. § 103(a) over the combination of Chau et al. (Chau) in view of Koo et al. (Koo), both of record. For the reasons set forth below, Applicant respectfully requests that the Examiner reconsider and withdraw the final rejection.

The amendment to Claim 23 is intended to correct a typographical error in the indication of the claim's dependency. Applicant thanks the Examiner for calling Applicant's attention to the error.

In the Office Action the Examiner acknowledged that Chau does not disclose use of a sulfonic acid for the formation of a reverse osmosis (RO) membrane. He contends, however, that Koo does teach sulfonic acids for RO membrane synthesis, and that therefore Chau and Koo are properly combined to reject Applicant's claims. Applicant respectfully submits that the Chau and Koo technologies are quite different chemically, and that therefore one skilled in the art would not consider that the Chau and Koo references make Applicant's invention obvious under § 103(a).

Considering first Chau, Chau forms a membrane from a polyamine or bisphenol deposited on a porous support followed by formation of a surface layer of the membrane by surface contact of the deposited membrane with a polyacyl or polysulfonyl halide or a polyisocyanate (col. 4, lines 51-66). Chau teaches that the thus-formed membrane may thereafter be treated with any of a number of acids, including sulfonic acids (col. 6, lines 59-65), for the purpose of extracting sodium salts which may be present. Among the exemplary acids he cites are sulfonic acid¹ and p- and m-toluene sulfonic acids (col. 7, lines 8-9).

Thus Chau's teaching is not of using any sulfonic acid in the formation of the

¹ As the Examiner is aware, there is no compound individually known as "sulfonic acid." Since Chau offers no further definition of what is meant at this point in the patent, those skilled in the art would conclude that the only actual examples taught by Chau are the p- and m-toluene sulfonic acids identified.

membrane, but only of subsequently washing the formed membrane with the acid to remove any residual sodium salts present.

Koo teaches an entirely different chemical system for membrane formation. He teaches formation of a membrane by deposition on a support of a reaction product of 1) a polyfunctional amine, 2) an acyl or sulfonyl halide or an isocyanate, and 3) an amine salt of a strong acid (col. 2, line 65 - col. 3, line 5). Among the "strong" acids he mentions from which the amine salt can be formed are several sulfonic acids (col. 3, lines 33-36). It is clear, however, that the reactant is the salt and not the acid (col. 5, lines 20-24).

Two major differences in the chemistries of the two references are therefore evident. First, Chau does not use any acid or salt in the formation of his membrane. The only use of an acid is as a wash for subsequent sodium salt removal from the previously formed membrane. Second, Koo does not teach the use of acids at all as active ingredients in his disclosure -- instead what he teaches is the use of amine salts of acids.

The combination of Chau and Koo therefore fails on both grounds. One skilled in the art would not consider any substitution of Koo's acids into Chau formation process, since Chau does not use any acid in that process. As to the consideration that Koo's acid could be used in Chau's washing step, that is redundant, since Chau already teaches for that purpose many of the same acids, including sulfonic acids, that Koo teaches. Therefore addition of Koo to Chau on the basis of acid disclosure is of no patentable significance, since Koo adds nothing that is not already in Chau.

As to the second ground, there would be no consideration of Koo as teaching anything else about addition to Chau's process, since Koo does not teach any acid as an active reactant, but rather teaches only amine salts as reactants. Amine salts of course are much different and, most importantly, are known to be much more basic than the acids from which they are formed, since amines are known to be a distinctly basic species; compare, e.g., Ginsburg, CONCERNING AMINES: THEIR PROPERTIES PREPARATION AND REACTIONS (Pergamon Press: 1967), pp. 2-6 and 62-69, with King, "Acidity", and Bentley, "Directing and Activating Effects in Reactions Involving Sulphonic Acids and Derivatives",

both in Patai et al., (eds.), THE CHEMISTRY OF SULFONIC ACIDS, ESTERS AND THEIR DERIVATIVES (John Wiley & Sons: 1991), Ch. 6, pp. 250-252 and Ch. 16, pp. 685-686, respectively², thus imparting substantial basicity to their salts. Thus those skilled in the art would recognize that Koo's amine salts would be unsuitable additions to Chau's membrane reactants, since Chau uses neither acids nor salts, and that even as a wash a salt would be unusable since it would not perform the sodium salt purges which Chau teaches. One does not insert a more basic salt where an acid is wanted. Thus Koo's amine salts would be both unnecessary and detrimental in Chau's system.

When the technologies of the cited prior art references are, as here, shown to be mutually incompatible, a § 103(a) obviousness rejection based on their combination cannot be supported. The rejection based on the combination of Chau in view of Koo therefore must be withdrawn.

As support for Applicant's request for reconsideration, Applicant is submitting herewith his Affidavit Under 37 C.F.R. § 1.132, describing several comparative experiments he has conducted to demonstrate the distinctions between his claimed process and the processes of Chau and Koo. It is submitted that these data are highly relevant and material to the issue of patentability of the claimed invention, and that they represent the closest possible comparative data, notwithstanding that the Examiner's rejection is not on Chau or Koo alone, but rather on the Examiner's theorized "combination process" of the two. In the present case, however, as Applicant states in the Affidavit (and for the reasons set forth above), it is not technically possible to actually make any such "combination" of Chau and Koo. Therefore Applicant has provided data on a commercial product (sold by the assignee of this application under the trademark ESPA®) which has some characteristics which it is believed parallel what such a "combination" product of the type speculated on by the Examiner might be. Other deficiencies of both Chau and Koo which make them different from Applicant's system and also mutually incompatible with each

² Copies of these references are attached for the Examiner's convenience.

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other will be evident from the data presented.

From Applicant's Affidavit data the following conclusions are evident to those skilled in the art. First, the general teachings of both Chau and Koo are away from the flux and salt rejection rates as claimed in Applicant's process, in that their systems result much lower fluxes and much higher rejections. From the comparative data presented by Applicant those in the art would recognize the Chau and Koo teachings as being inherently far different from Applicant's process. This in turn would reinforce their conclusions that the critical distinctions identified above as to salt and acid usage preclude any combination of Chau and Koo and any finding that Applicant's claims could be obvious from those references.

Second, the data confirm the showing previously made by Applicant in his January 21, 2003, Response (Paper No. 8) that the high molecular weight sulfonic acids (i.e., those of $>C_6$ content such as m- and p-toluene sulfonic acids) shown in both Chau and Koo produce results far inferior to Applicant's invention. Chau and Koo present no criteria by which one could identify Applicant's claimed C_1 - C_6 range, and therefore combination of Chau and Koo would necessarily teach away from Applicant's invention in that such a combination would include many inoperative species. (Indeed, given that Chau does not exemplify any sulfonic acids of C_6 or below, one would conclude that all of the Chau/Koo combinations would be inoperative.)

In summary, Applicant submits that for the reasons set forth above, as supplemented by the data presented in the accompanying Affidavit, the obviousness final rejection made by the Examiner is not warranted. The Examiner is therefore respectfully requested to reconsider and withdraw that final rejection and allow all claims presently in the application.

FEES

It is not believed that any fees are due with respect to the amendment of the claims herein, other than the extension of time fee mentioned above. However, should any

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additional fees be due, the Patent and Trademark Office is authorized to charge all such fees to Deposit Account No. 02-4070.

CONCLUSION

In view of the above amendments and remarks, it is respectfully submitted that all grounds of rejection and objection have been avoided and/or traversed. The Examiner is therefore respectfully requested to enter the amendments herein, reconsider and withdraw the rejections and objections and allow Claims 15-21, 23 and 25-26, as amended, all claims in the case following amendment.

Should the Examiner elect to maintain one or more of the grounds of rejection or objection, it is respectfully requested that the amendments herein be entered into the record as placing the case in better form for appeal.

Should the Examiner believe that allowance of this application might be expedited by further discussion of the issues, a telephone call to the undersigned attorney, collect, at the telephone number listed below, is cordially invited.

Respectfully submitted,

Date: June 18, 2003

By: _____


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